L. W. BUGBEE.

LENS DRILLING MACHINE.

APPLICATION FILED JULY 23, 1915.

1,196,656.

Patented Aug. 29, 1916.

2 SHEETS—SHEET 1.

Fig. I.

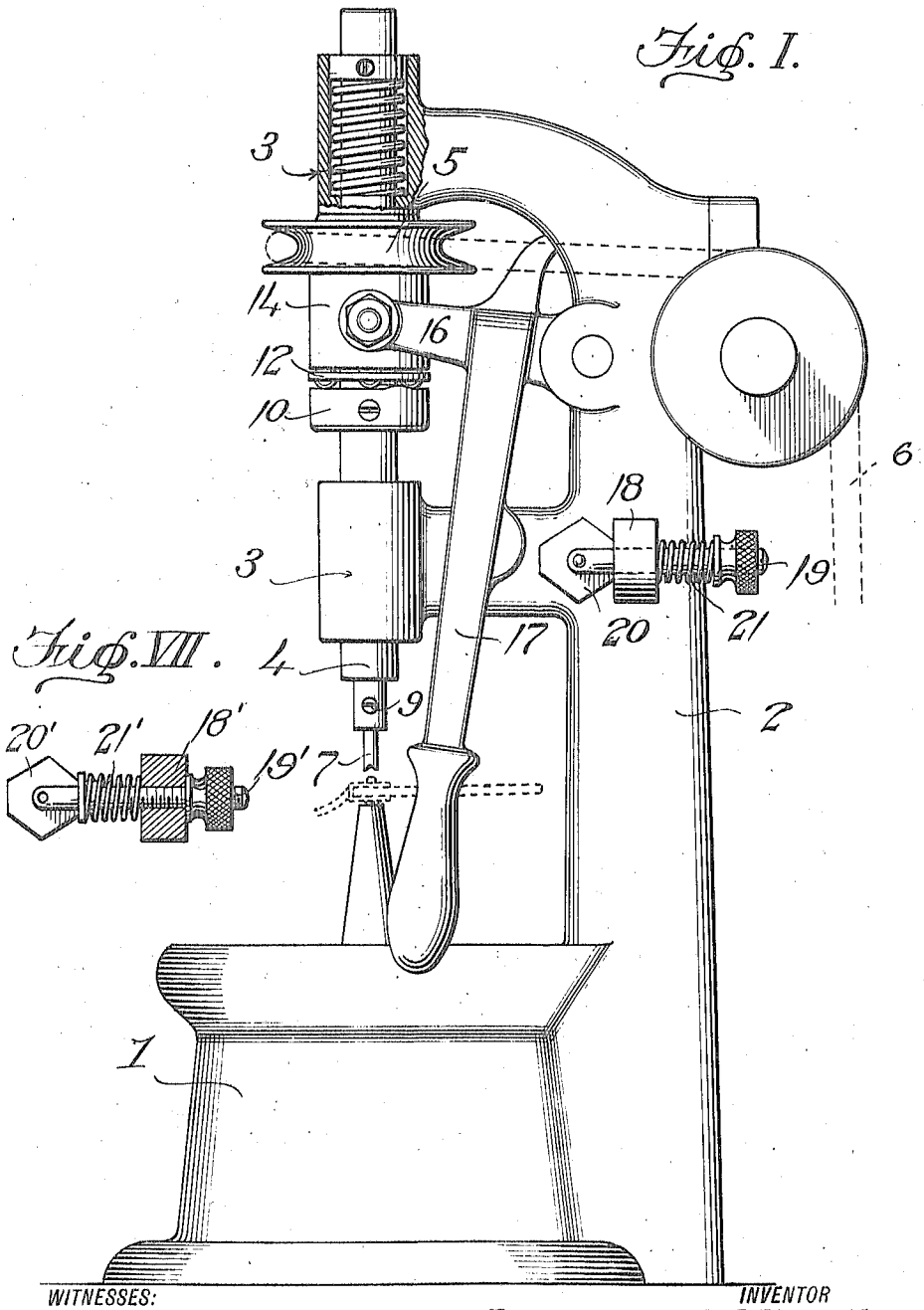


Fig. VII.

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2 SHEETS—SHEET 2.

Fig. II

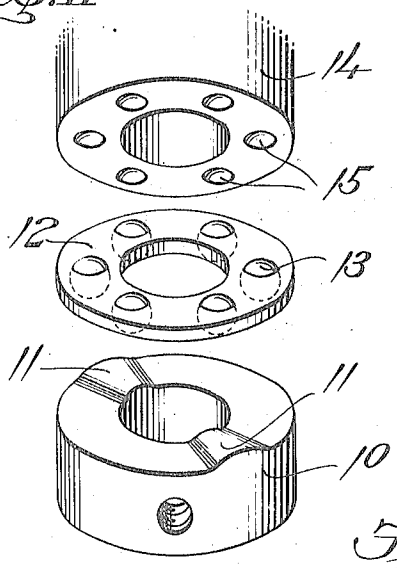


Fig. III.

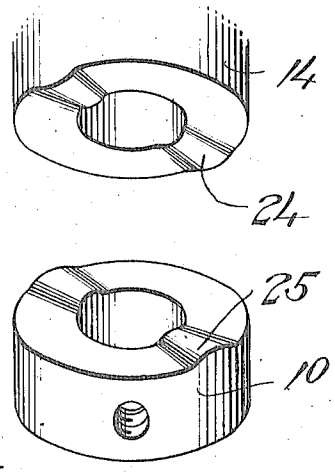


Fig. VIII.

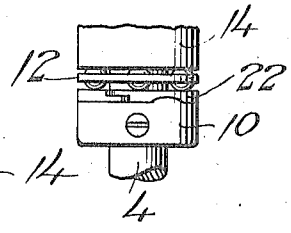


Fig. IV.

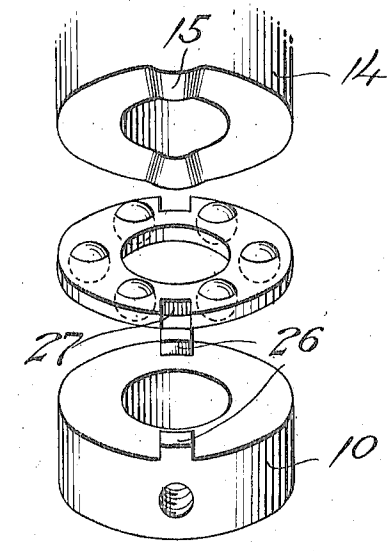
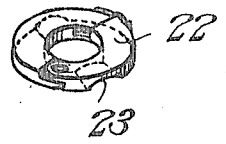


Fig. IX.



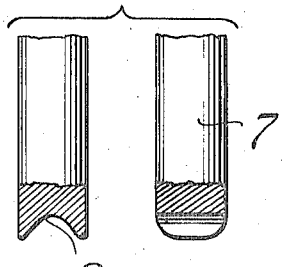
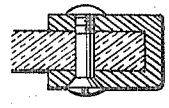


Fig. V.

Fig. VI.



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LENS-DRILLING MACHINE.

1,196,656. Specification of Letters Patent. Patented Aug. 29, 1916.

Application filed July 23, 1915. Serial No. 41,485.

To all whom it may concern:

Be it known that I, LUCIAN W. BUGBEE, a citizen of the United States, residing at Southbridge, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Lens-Drilling Machines, of which the following is a specification.

This invention relates to lens drilling machines, and has particular reference to a machine of this character which has means associated therewith for securing the lens screw against accidental removal from the clip after the lens has been drilled and the clip applied thereto.

The principal object of the invention is to provide an attachment for the drill, whereby the same may be quickly and easily changed from a drill to a riveter, or vice versa, the machine as a riveter being adapted for spinning over the threaded ends of the lens screw to prevent its loss from the mounting.

Another important object of the invention is to provide a spindle for carrying the operating tool—either the drill or riveting tool—to provide means for moving the tool into engagement with an article to be operated upon, to provide means for automatically returning the spindle and tool to a normal position upon releasing the means for moving the tool into engagement with the article, and to provide adjustable stop means whereby the limit of movement of the tool toward the article may be varied.

Another principal object of the invention is to provide means for accomplishing a reciprocating movement of the spindle when the machine is assembled as a riveter, whereby the riveting operation is facilitated, and to provide a novel and efficient tool for attachment to the spindle for spinning over the end of the lens screws which will be rendered most efficient under the action of a reciprocatory as well as rotatable movement.

Another object is to provide a machine of the character set forth which will be extremely simple in construction, cheap and easy to manufacture, and which will be thoroughly reliable and efficient in use and easy of operation.

With the foregoing and other objects in view the invention consists in the novel features of construction, combination and arrangement of parts, as will be hereinafter more fully described, illustrated in the accompanying drawings and claimed.

In the drawings: Figure I is a side elevation of a machine constructed in accordance with the invention. Fig. II is a perspective view illustrating the preferred means of accomplishing a reciprocatory movement of the tool holding spindle. Fig. III is a similar view of a slightly modified form of means for accomplishing the same results. Fig. IV is a view of another slightly modified form of means for accomplishing the same results. Fig. V are fragmentary sectional views taken at right angles to each other through the lower portion of the spinning tool. Fig. VI is a sectional view through a portion of a lens and clip, showing the manner in which the lens screw is spun over or riveted by the improved machine. Fig. VII is a detail view of a modified form of stop mechanism. Fig. VIII is a detailed view illustrating the manner of changing the machine from a riveter to a drill. Fig. IX is a detailed perspective view of the member for accomplishing the results shown in Fig. VIII.

Referring to the drawings by numerals, 1 designates the base of the machine carrying the frame 2 which is provided with the bearing bracket 3 for the tool holding spindle 4, a pulley 5 being journaled upon the spindle and having a belt 6 journaled thereover for rotating the same.

As previously mentioned, my machine is adapted to serve as either a riveter or as a drill. When used as a riveter it is especially adapted for spinning over the threaded ends of lens screws or the like to prevent their accidental loss or loosening from the mounting. To accomplish this purpose it is desirable that the tool operating upon the end of the screws should have a reciprocable, as well as rotatable movement, in order that the material of the screw may be hammered down upon the clip and shaped into a desired form, and to further aid in accomplishing this result a novel form of tool for

operation upon the screw has been provided, which comprises a shank 7, having the operating end thereof provided with a substantially V-shaped groove 8 which extends across one diameter thereof. This groove is shaped to the curve desired to be formed upon the end of the lens screw and it will be noted that because of the wedge shape of the groove the hammering action of the tool will cause the material of the screw to be concentrated about the end thereof and because of the rotation of the tool this concentrated overturned portion of the screw will be formed into a neat and efficient rivet head. This tool may be either formed on the spindle 4 or made detachable therefrom, as by providing a socket in the end of the spindle and detachably engaging the tool therein by means of a screw 9 or the like.

The means for accomplishing a reciprocatory movement of the spindle 4 comprises a collar 10, which is rigidly mounted upon the spindle, and which has formed on the upper face thereof cam portions 11; a retainer 12 carrying the anti-friction balls 13, which is loosely mounted upon the spindle in a position so that the balls 13 will aline with the cam faces of the collar; and a sleeve 14 which is also loosely mounted upon the spindle and which is provided on its under face with recesses 15 to receive the balls and thus prevent rotation of the retainer relative to the sleeve.

An arm 16 is pivoted to the sleeve 14 at one end and at its opposite end is pivoted to the frame 2, which serves to prevent rotation of the sleeve, as will be understood. An operating handle 17 extends from this arm to a point within convenient reach of the operator of the machine and by reference to the drawings it will be seen that movement of the handle in one direction will cause the sleeve to move into engagement with the balls and the balls in turn will engage with the collar 10 whereby further downward movement of the handle will cause downward movement of the spindle and tool to bring the tool into engagement with the mounting to be operated upon.

While held in the position just described it will be apparent that rotation of the spindle will cause the cam portions of the collar 10 to alternately engage the balls 13 and upon engagement with each successive ball, cause a slight downward movement of the spindle, due to the fact that the balls are held relatively stationary while the collar is rotatable, and it will be understood that by varying the number of balls the number of reciprocations of the spindle 4 upon each rotation thereof will be accordingly varied. Any desired means such as a spring or the like may be secured to any preferred portion of the operating parts of the machine to cause the return of the spindle 4 to a normal position upon releasing the handle 17 or upon the cam portion of the collar 10 passing over the balls 13. The particular means illustrated consists of a coil spring, arranged in a recess in one of the brackets 3, which has one end abutting a shoulder on the bracket, and the other end abutting a collar on the spindle, the spring exerting an upward tension upon the collar to retain the spindle normally in a raised position, as will be understood.

It is well known that lens clips are manufactured in various standard widths to fit lenses of various thicknesses, and therefore novel means have been provided upon the machine whereby the limit of movement of the tool 7 toward the mounting may be readily and instantly varied to accommodate the machine to any particular thickness of mounting being operated upon. A lug 18 is carried upon one face of the frame which has an opening formed therein through which passes a rod 19. An irregularly shaped hexagonally-shaped plate 20 is rotatably carried upon the inner end of this rod, and has the three parallel faces thereof of various relative distances apart, one of the faces being adapted to abut against the lug 18 and the opposite parallel face being adapted to lie in the path of movement of the arm 17, whereby the arm will strike thereagainst and its inward movement stopped, and as will be understood the limit of movement of the tool toward the article being operated upon will be stopped accordingly. It will thus be seen that by rotating plate 20 to bring any one of the parallel faces thereof into the path of movement of the arm 17 the limit of inward movement of this arm will be accordingly varied. The rod 19 is slidably mounted in an opening in the lug 18 and has a coil spring 21 arranged thereon which has one end abutting the lug 18 and the other end abutting a nut upon the end of the rod. By this arrangement the plate 20 may be grasped and moved slightly toward the handle 17 against the action of the spring 21 and then rotated to bring the desired face of the same into the path of movement of the arm 17 and then released, whereby the spring 21 will draw the rod back and hold the flat face of the plate into engagement with the lug 18, which will prevent rotation thereof and thus retain the plate in any desired position.

In Fig. VII of the drawings I have illustrated a slightly modified form of stop mechanism which consists of a plate 20′ rotatably mounted upon the end of a rod 19′ which is threaded into the lug 18′ instead of being slidably mounted therein, as in the preferred form of stop mechanism. A spring 21′ is arranged upon the rod 19 and has one end abutting a sleeve which is also slidably mounted upon the rod 19′ to move

this sleeve into engagement with one flat face of the plate 20′ to retain the plate in any desired adjusted position, the inner end of the spring being arranged to abut against the adjacent face of the lug 18 in a manner similar to the form of stop mechanism previously described. The particular advantage gained by this stop mechanism resides in the fact that the threaded engagement between the rod 19′ and lug 18′ permits of adjustment of the plate 20′ as an entirety toward or away from the handle 17, so that when a new tool 7 is substituted for one previously used it is unnecessary to adjust the tool relative to the spindle 4, as the tool may be secured in any approximately correct position upon the spindle and adjustment of the rod 19′ made through the lug 18′ to bring the stop plate 20′ in a correct position to permit of movement of the tool various predetermined distances toward the article to be operated upon.

The machine as just described is adapted particularly as a riveter but by the use of a device such as is shown in Figs. VIII and IX of the drawings, it may be readily and instantly converted into a drilling machine. This device comprises a split washer 22 which is adapted to be snapped upon the spindle 4 as is shown in Fig. VIII of the drawings, and has recesses formed in one face thereof to fit over the cam faces 11, as is clearly shown. When this washer is arranged upon the machine as described the plain face thereof will be engaged by the balls 13 and consequently upon rotation of the spindle no reciprocatory movement will be imparted thereto. It will thus be seen that it is only necessary to apply or remove this washer to or from the machine in order to convert the same into either a drill or a riveter.

In Fig. III of the drawing I have illustrated means whereby the balls 13 may be dispensed with and reciprocation of the spindle 4 accomplished by providing upon the lower face of the member 14 and upon the upper face of the member 10, cam members 24 and 25 respectively, which are adapted to co-act upon rotation of the spindle for the purpose mentioned.

In Fig. IV of the drawing I have shown the cam faces 15′ as being provided upon the member 14 and have dispensed with the recesses 11 for preventing rotation of the retainer, by forming lugs 26 upon the upper face of the member 10, and by forming recesses 27 in the retainer for engagement with lugs. It will be noted in this instance that the balls are relatively rotatable while the cam is relatively stationary.

From the foregoing description taken in connection with the accompanying drawings it is thought that the construction and operation of the improved machine will be readily understood, and while I have herein shown and described certain specific embodiments of my invention I do not wish to be limited thereto except for such limitations as the claims may import.

I claim:—

1. In a machine of the character described, the combination with a standard having bearings, of a spindle slidably and rotatably mounted in said bearings, a collar secured on the spindle having an upper undulating surface, and a non-rotatable shifting device encircling the spindle and having a plurality of projections on the under face thereof adapted to engage the undulating surface of the collar, whereby the inter-engagement of the projections and surface will cause a vibratory movement of the spindle upon rotation thereof.

2. A combination with a support and a spindle slidably and rotatably mounted therein, of a spring for pressing the spindle in one direction, a shift member for actuating the spindle in the opposite direction, said shift member having a plurality of projections on the side thereof opposed to the spring action, and a collar secured on the spindle and having an undulating surface adapted to engage the projections and be held thereagainst by the spring, whereby the inter-engagement of the projections and surface will cause a slight reciprocating or vibratory movement of the spindle upon rotation thereof.

3. The combination with a rotatably mounted spindle, of a collar on the spindle having an undulating surface, a contact member encircling the spindle and having a plurality of projections adapted to engage said surface of the collar, means for holding the projections and surface in engagement one with the other, whereby a slight reciprocating movement will be imparted to the spindle upon rotation thereof due to the engagement of said parts, and a steadying member for insertion between the projections and surface of the collar, said member having an under face adapted to fit the undulations of the collar to rotate therewith and having a plain upper face for engaging the projections, whereby the spindle may spin without vibration or reciprocation when said device is applied in position thereto.

4. A combined machine for the purpose described, including a base, a spindle slidably and rotatably supported by the base, a spring for sliding the spindle in one direction, means for manually shifting the spindle in the opposite direction, including a shift yoke, a sleeve encircling the spindle and engaged by the yoke, said sleeve having a plurality of contacts projecting therefrom, a collar secured to and rotatable with the spindle and having an undulating surface inter-engaging with the contacts on the

sleeve, whereby movement of the yoke will shift the sleeve and spindle as an entirety while rotation of the drill will cause a relative reciprocation of the sleeve and spindle, and a steadying device adapted to be interposed between undulating surface and the contact having its lower surface adapted to rest evenly upon said undulating surface and having a plain upper surface over which the contacts may move in a smooth manner without occasioning vibration or reciprocating movement of the spindle.

In testimony whereof I affix my signature in the presence of two witnesses.

LUCIAN W. BUGBEE.

Witnesses:

EDITH M. HALVORSEN,

JOSEPH J. DEMERS.